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ABSTRACT

This study evaluates the effectiveness of a 4-H TV Science Club Project Series, in Jackson County, Georgia, conducted in January, 1970, by the Georgia Cooperative Extension Service for upper elementary school age students in Georgia. Its objectives are: (1) To obtain information useful to Extension personnel and others interested in planning and improving new and existing programs; (2) To indicate patterns of participation for different age levels; and (3) To indicate television's potential as a general teaching tool. All science teachers in Jackson County conducted pre- and post-tests and adopted programs as part of their science curriculum. Programs were discussed in class following non-school viewing, and students reported on activities related to project. It was determined that television can be used effectively in teaching science and helping students and parents to become more familiar with 4-H Club work. Students in lower grades were more favorable to programs than those in higher grades. (Author/NF)

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AN EVALUATION OF THE EFFECTIVENESS OF THE 4-H TV SCIENCE PROJECT IN JACKSON COUNTY

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A Project in Agricultural Extension Education

Submitted to

The College of Agriculture

University of Georgia

In Partial Fulfillment

of the Requirements for Course Credit

in

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by

Ronnie R. Mathis

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CHAPTER I

INTRODUCTION

The strength of the United States as a nation in future years will be no greater than that provided for in the training of today's youth. The responsibility of providing significant learning opportunities within the ordinary life experiences of young people is a task confronted by all youth educators. Maximum efforts to develop the fullest potential of all young people will be required not only of educators, but also of every citizen.

Through the 4-H Club program, extension agents and local leaders help young people move from immaturity to maturity. This youth program is one of the most popular and widely-known youth organizations of today. Four-H is the youth phase of the Cooperative Extension Service Program designed to provide learning opportunities for boys and girls in subject-matter areas.

In order for any 4-H Club effort to carry out the purpose for which it is designed, the extension agent in any area must be aware of the interests and capabilities of local youth and provide useful and challenging activities for their development. Existing activities that are not sufficient must be revised or discarded and new ones developed.

Youth programs must be in step with the current situations and provide opportunities which are challenging at advancing maturity levels so that youth are prepared for economic, social, and leadership responsibilities as adults.

According to the Scope Report issued by the Cooperative Extension Service, useful work experience, ownership and management of property, marketing, practical records, and reporting of achievements are all important in youth development.[1]

Competencies and desirable character traits learned in 4-H Club work should carry over not only for agriculture and homemaking but for other vocations and life experiences. It is essential that youth be assisted in exploring different types of careers in order to make wise decisions. Extension should supplement any career counseling services available as it works with rural youth.[2]

Originally the purpose of 4-H Club work was to provide educational opportunities for boys and girls. To accomplish this purpose the organizers were confronted with such matters as (1) the content of the program, (2) the organization of the content, (3) the execution of the program, and (4) the circumstances of presentation.[3]

The 4-H Club program must adapt to the changing environment and find better ways to reach a larger clientele.

The 4-H TV Science Series is an activity initiated in an attempt to provide such learning experiences for today's youth. This study was designed to evaluate the effectiveness of the 4-H TV Science Series in

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[1]P. A. Miller, et al. The Cooperative Extension Service Today: A Statement of Scope and Responsibility. April, 1958, p. 11.

[2]Ibid.

[3]G. L. Carter, Jr., "A Conception of 4-H," Journal of Cooperative Extension, Vol. I, No. 3 (1963) p. 171.

Jackson County. In January, 1970, the Georgia Cooperative Extension Service initiated broadcasts of the 4-H TV Science Series throughout the state of Georgia. The programs were designed for upper elementary school age students.

The writer contacted all school officials and science teachers in Jackson County and explained the program to them. The teachers agreed to conduct pre and post tests, were urged to acquaint students with the programs and to adopt the program as a part of their science curriculum. Also, teachers were encouraged to discuss the programs in class the week following the non-school viewing and to allow the students to report on activities carried out in relation to the project. All the information contained in this study is related only to Jackson County.

STATEMENT OF PROBLEM

The 4-H Club program in Georgia is planned for three different age groups - Cloverleaf, Junior, and Senior. Membership of the younger groups usually far exceeds the membership in the older age class.

A television set now occupies a spot in nearly every American home and in many schools within range of a television station. A turn of the switch emits a combined verbal and visual exposure to world events, light entertainment, sports events, drama, cartoons, televised instruction, and many other types of programs.

The use of television in education has been highly praised, damned, misused and made the subject of propaganda, both pro and con.

Diamond[4] contends much of the discussion has missed the point: in reality the effectiveness of television depends upon what is televised and how it is applied, for the medium is simply a means of transmission and nothing more.

Television in education should be defined as a medium of instruction and be treated as such. Television should be given the same consideration as is given to radio, the phonograph, textbooks, and workbooks. These are all media designed to seek ways to improve the knowledge of boys and girls. Depending upon how the media is used, it can be very effective or ineffective.

The findings of this study will enable the County Extension Staff members and the State 4-H Club Office to have a better understanding of programs desired by Cloverleaf and Junior 4-H Club members. It will also indicate the pattern of participation for the different age levels.

The purpose of this study was to describe the 4-H TV Science Club Project. The data may also indicate something about television's potential as a general teaching tool. More complete knowledge concerning the nature of the appeal made by 4-H Club work in general should prove helpful to administrators and leaders in their efforts to broaden the scope and increase the effectiveness of their work.

DESCRIPTION OF THE 4-H TV SCIENCE SERIES

Teaching by television in the United States began on commercial

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[4]Robert M. Diamond, "Instructional Television: Its Potential and Its Problems", A Guide to Instructional Television, McGraw-Hill Book Company, New York, New York, 1964.

stations in the late 1940's. Elementary school classrooms receiving the first televised instruction were in the Philadelphia public schools in 1948, according to Gordon.[5] In 1961, an estimated 560 school districts and 117 colleges and universities were using commercial channels for regular instructional purposes, according to Lewis.[6]

Television was used in the 4-H TV Science Project as the medium for emitting ten professionally produced 4-H Club programs aimed at enrolling the viewing audience. Each program portrays a typical 4-H Club meeting guided by a volunteer leader during which project instruction, tours, reports, talks, demonstrations, recreation, and a business meeting are effectively blended together.

Based on learn-by-doing principles, 4-H TV Science introduces young people to ten general areas of science and offers a better understanding of 4-H among young people and their parents. The club members meet weekly to view the program for the week. Running time for the weekly programs is about 28 minutes, providing a total of nearly five hours of instruction. In addition, the 4-H'ers are encouraged to take part in individual learning activities based on information in the member's manual, a copy of which is given to each enrollee and science teacher.

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[5]Henry N. Gordon, Educational Television, Center for Applied Research in Education, Inc., New York, New York, 1965.

[6]Philip Lewis, Educational Television Guidebook, McGraw-Hill Book Company, New York, 1961.

The programs participated in by the members are aimed at the 9 to 12 age group (grades 4 through 7). The five members of the studio club are in the 10 to 12 age group and were selected as youth with whom others can identify.

HYPOTHESIS

The Hypothesis of this study is that the average mean score on the post test will not exceed the average mean score of the pre test.

PURPOSE OF THE STUDY

The purpose of this study was to obtain information which will be useful to Extension personnel and those interested in planning and improving new and existing programs.

The specific objectives of the study were as follows:

1. To compare test scores before and after the series of 4-H TV Science Programs by grade, sex, and farm and non-farm backgrounds, and assess the effectiveness of the program as an educational tool in reaching young people during non-school hours.
2. To determine what TV Science club members in the nine community schools like best about the TV Science Club Series and what they believe would improve it.
3. To determine the appeal of the TV Science Club to local science teachers and school officials.
4. To obtain information which would be helpful to Extension Administrators and Leaders in their efforts to increase the impact of 4-H.

IMPORTANCE OF EVALUATION

The problem of preparing and presenting programs that will meet the needs and interests of all 4-H youth has been a major concern of Cooperative Extension Service workers since the beginning of the 4-H program in Georgia.

The rationale behind local school cooperation in the 4-H TV Science Club project brings to mind many ideas. Almost all schools are limited in laboratory facilities, instructional materials, and other teaching resources needed in a good science program. Many activities and programs that would provide excellent learning experiences for the youth of a local school are not financially possible for the local school if that local school has to pay the entire costs of a specialist. A medium, such as television, can overcome that handicap. The 4-H TV Science Series makes it possible to have a number of experts for the nine community schools. These experts are shared by a large number of school systems. The excellent laboratory equipment and facilities make it possible for students to become familiar with items that they have read about but may have never seen.

Other ways in which the findings of this study will contribute are as follows:

(1) They will enable the County Extension Staff and the State 4-H Club Staff to have a better understanding of the importance and effectiveness of the 4-H TV Science Project Series of films.

(2) They will help determine the most effective time schedule for showing the films and determine the highest levels of achievement.

LIMITATIONS OF THE STUDY

1. The study was limited to grades four, five, six, and seven in all schools in Jackson County.
2. The pre and post tests were given during the regular science class periods. No attempt was made for those absent to take a make-up examination.

DEFINITION OF TERMS

The following words and terms are defined so that the author and reader may have a common understanding:

4-H TV Science Club. An organization whereby members carry out projects and view 4-H TV programs which are shown during out-of-school hours.

4-H Club. The organizational unit through which the 4-H Club program is conducted by County Extension Agents and local 4-H Club leaders.

4-H Club Program. Schedule of planned activities and events designed to supplement the training young people receive in the home, church, and school.

Cloverleaf 4-H Club Member. A boy or girl currently enrolled in a 4-H Club and also enrolled in a fifth or sixth grade in school.

Junior 4-H Club Member. A boy or girl currently enrolled in a 4-H Club and also enrolled in a seventh or eighth grade in school.

Senior 4-H Club Member. A boy or girl currently enrolled in a 4-H Club and also enrolled in the ninth, tenth, eleventh, or twelfth grade and within the age range of 14 years to 19 years.

Jackson County Schools. These are schools located in the cities of Jefferson and Commerce as well as in the Jackson County system located outside the two cities.

Studio Club. An organization composed of Jim Culver who is club leader, and 4-H'ers - Maureen Kenney, Karn Keirman, Graham Gal, Rex Gates, and David Gillespie who were the players in TV Science Project Series.

Producer. The 4-H TV Science Club was produced by WMSB, Michigan State University Television, and was used by the University of Georgia Cooperative Extension Service, Athens, Georgia, 1969.

Telecasting Commercial Stations. The 4-H TV Science Club Series was shown on two commercial television stations in Atlanta. Channel 2 telecast its first program on Thursday, February 5, 1970, at 6:30 a.m. Likewise, Channel 5 telecast its first program on

Sunday, February 8, 1970, at 8:30 a.m. and weekly thereafter.

Telecasting Educational Station. The 4-H TV Science Club Series was shown on Channel 8 in Athens on Monday, February 2, 1970, at 4:30 p.m. and weekly thereafter.

CHAPTER II

REVIEW OF RELATED LITERATURE

A review of related literature revealed that no previous investigations had been made on the effectiveness of the 4-H TV Science Club.

However, other studies have been made which are relevant to the subject of this paper. Martin[1] states: "Experience has shown that rural boys and girls remain in 4-H Club work longer if the program is based upon their interest and needs." Also, in this study the arranging of the learning situation and the application of the laws of learning to the project method in 4-H Club work are discussed.

According to Brown[2], all organizations must keep pace with the changing of people's ideas and thoughts. They must constantly shift and allocate resources to become more effective and efficient. The leaders of organizations have the responsibility to keep the goals and objectives current and up-to-date. Four-H must adapt to the changing environment and find ways to reach a larger clientele and increase membership. Only in this way can the Extension Service make its maximum contribution and reach its goal of helping the

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[1]T. T. Martin, "The Learning Situation in 4-H Club Work." Extension Study 4. Columbia, Missouri, June, 1948.

[2]Emory J. Brown, "Increasing 4-H Impact", Journal of Cooperative Extension, Volume V, Number 3, 1967, p. 141.

youth of our Nation grow and develop into useful and worthwhile citizens.

Basic needs of young people[3], have been studied and much important information has been revealed. Today's youth live in an increasingly complex society. There are more opportunities for young people than ever before in our history. Only those organizations with the greatest eye appeal will be able to maintain high membership.

The responsibilities of the Extension Service in youth development[4] have been studied and among those responsibilities are providing educational opportunities for the developing of mental, physical, social and spiritual growth of young people.

Studies of ways to increase 4-H enrollment[5] have been conducted. Such points as good meetings, programs planned well in advance, a wide variety of activities, devoting time and effort to become well-trained, and expanding publicity beyond project winners have helped to make many 4-H Club programs very successful.

Studies to determine the "Drop-out" in 4-H[6], and "Who Joins

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[3]Glenn C. Dildine, "Basic Needs of Young People," A paper presented at the National Extension Conference on YMW work, Robert Allerton Park, Illinois, Oct. 5, 1953.

[4]_____, The Responsibility of the Cooperative Extension Service in Youth Development, 26 pp, Mimeograph Undated.

[5]Laurel K. Sabrosky, "Boosting 4-H Re-enrollment," U.S.D.A., Federal Extension Service, p. 338.

[6]James H. Copp and Robert C. Clark, "Why the 'Drop Outs' in 4-H?" Selected Readings and References in 4-H Club Work, G. L. Carter, Jr. and Robert C. Clark, editors (National Agricultural Center for Advanced Study, No. 11. Madison: University of Wisconsin, 1961) pp. 77 - 79.

4-H Clubs?"[7] have revealed information that has been useful in planning and keeping programs up-to-date.

Efforts have been made to formulate a conception of 4-H Club work with the possibility that such an approach could aid Extension in its attempt to examine efforts in youth work and to formulate programs for the future. The well-developed 4-H program can provide significant learning opportunities within the ordinary life experience of young people.[8]

Sabrosky suggests the younger the age at which a member enrolls in 4-H, the more likely he is to re-enroll. Girls and boys from farm homes tend to re-enroll in greater proportion than those from non-farm homes. Those from the upper socio-economic levels tend to re-enroll for more years than those from the lower levels.

The Educational Media Study Panel[10] has raised the question "How can television contribute most to education?" and has remarked that:

"The spectrum of instructional uses of television is not

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[7]Burton W. Kreitlow, Lowell Pierce and Curtis Middleton, Who Joins 4-H Clubs? Research Bulletin No. 215, University of Wisconsin, Madison, Wisconsin, 1959, pp. 19 - 20.

[8]G. L. Carter, Jr. "A Conception of 4-H - Part II", Journal of Cooperative Extension, Vol. I, Number 4, 1963, p. 237.

[9]Laurel K. Sabrosky, "Enrollment, Re-enrollments, Completions." Cited by G. L. Carter, Jr. and Robert C. Clark. The National Agricultural Extension Center for Advanced Study, University of Wisconsin, Madison 6, Wisconsin, p. 136.

[10]Official advisory group to the U. S. Commissioner of Education and Office of Education. Educational Television Today.

> completely known. It is clear that there are some teaching acts it can do superlatively well. It can let a large number of students look into a microscope at the same time or watch surgical procedures from close at hand. It can let a class watch an activity that would be spoiled by direct observation. But there are also some things it cannot do. It cannot conduct a seminar discussion efficiently. It cannot give specific and direct personal help. These uses and limitations are clear, but how much longer the list may be is not known."

Also, television can expand, not only in the number it reaches, but in depth and coverage of its programming procedures.[11]

According to Gordon[12], under controlled experiments, students taught by television did about as well - sometimes worse, frequently better - as students taught under normal conditions. For the most part, no appreciable difference was noted between live classes and television classes. Once they get used to it, elementary school teachers seem to enjoy television in their classrooms for cooperative teaching or enrichment. Many teachers of this age level welcome almost any relief from the constant demands of children. A well-conceived televised lesson may provide a perfect change of pace for both children and teachers.

A study by Cassirer[13] revealed that the teaching of natural sciences is harassed by a shortage of science teachers, who frequently

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[11]Allen E. Koeing and Ruanne B. Hill - The Farther Vision, Educational Television Today, 1965, p. 226.

[12]Henry N. Gordon, Educational Television, Center for Applied Research in Education, Inc., 1965, New York.

[13]Henry R. Cassirer. Television Teaching Today, United Nations Educational, Scientific and Cultural Organization, Impriemerie Journe, Paris, 1960, p. 99.

find more rewarding employment in industry and government. Many schools are lacking in equipment for demonstrations and experiments. Such shortcomings are strongly felt because modern conditions require intensive science teaching for all ages. At the same time, the field of science requires visual demonstration.

Regarding how extensively television is used in education in the United States, Murphy and Gross[14] tell of the findings of a 1969 National Instructional Television Library survey of educational institutions. The survey analyzed the estimated television enrollment of eleven million as follows: about 7,500,000 in the elementary grades; a little over two million in secondary schools; a little over 600,000 in colleges and universities, and one million of undetermined grade level. In relation to actual school enrollment, the figures demonstrate that TV made its educational mark predominantly in the lower grades. The use of TV in the secondary school was not much higher proportionately than it was in higher education.

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[14] Judith Murphy and Ronald Gross. Learning by Television, the Fund for the Advancement of Education, New York, New York, 1966, p. 34.

CHAPTER III

PROCEDURES

SELECTING THE SUBJECTS

All students in grades four through seven were encouraged to join and participate in the 4-H TV Science Club project. These students were from nine community schools throughout Jackson County.

DEVELOPING THE QUESTIONNAIRE

The questionnaire was developed to establish a benchmark. Four different tests were designed for the grades four through seven. The questions on each testing instrument were developed so as to become more difficult in ascending order.

Many of the school officials cooperated with the author in developing the questionnaire and were eager for their students to participate in learning experiences in relation to science and 4-H Club work.

After developing the instrument, it was pilot tested and then several changes were made in an effort to bring out more and better information on the persons taking the tests.

Ten students from grades four through seven from the Jefferson City School System were subjected to the test. Then final modifications and changes were made, and the instrument was duplicated so that the same test could be given before and after the series of programs.

After the first test was given, no attempt was made to answer the questions on the test. By doing this it was felt that the second test would reveal the effectiveness of the series. Effectiveness was defined as the degree of participation and the resultant learning by students. The time required for completing the questionnaire was approximately forty minutes. The author explained the questionnaire to the science teachers in all nine community schools in the county and they in turn administered the test to all students in grades four through seven in the regularly scheduled science class period.

After the questionnaires were administered, the author compiled the data on age, grade, sex, race, and place of residence.

In order to establish the truth or falsity of the stated hypothesis it is necessary to determine whether the two sample means from the paired populations differ significantly. A commonly accepted method of testing significance for distributions consisting of less than thirty subjects is the "t" test. For distributions containing more than 30 subjects, the "z" test is used.

CHAPTER IV

EVALUATION OF RESULTS

Participation by Community Schools

All of the nine community elementary schools in Jackson County participated in the 4-H TV Science Project. Most of the Science teachers in the various schools attempted to incorporate and relate the series of filmed programs into the class activities and assignments.

Since most of the schools were rather limited in resources, most of the teachers and school administrators considered the project to possess a tremendous potential in providing learning experiences that would not have been possible if the local school had to pay the cost of a specialist in the various areas of science. One school principal suggested that students in lower grades also participate by viewing the programs and carrying out some of the activities suggested in the telecasts.

Some teachers of these lower grades reported that various science and 4-H projects were completed as a result of the telecasts on the 4-H TV Science Programs.

The programs most interesting to the lower grades were as follows: fire, animals, astronomy, meteorology, chemistry, and plants. Programs having less appeal were those on physics and behavior.

Approximately sixteen hundred students enrolled in the 4-H TV Science Project in Jackson County. However, only three hundred and ninety-nine students actually completed the project by taking the pre test and post test and filling out the questionnaire properly.

The distribution by grade level, sex, race, and place of residence is shown in Table I. This table shows the division of the three hundred and ninety-nine students who completed the project from Jackson County and who were considered in the interpretation of the results.

TABLE I

DISTRIBUTION OF STUDENTS IN THE 4-H TV SCIENCE PROJECT IN JACKSON COUNTY ELEMENTARY SCHOOLS BY GRADE, SEX, RACE AND PLACE OF RESIDENCE

Respondents

School Grade	Sex		Race		Place of Residence	
	Male	Female	Caucasian	Negro	Non-Farm	Farm
4	58	37	85	10	66	29
5	54	71	114	11	93	32
6	44	36	67	13	50	30
7	45	54	86	13	55	44
Total	201	198	352	47	264	135

Extent of Learning

To evaluate the effectiveness of the 4-H TV Science Project, a testing instrument consisting of twenty questions was given to all

students in grades four through seven. If the science programs were reaching the students effectively, one would expect them to have an increase in knowledge as a result of being exposed to the 4-H TV Science Project.

Table II shows results of the pre test and post test of all fourth grade students. All groups had an increase in average mean scores with the non-farm and female groups showing the greatest improvements with an average mean score increase of 16.8 and 12.6 respectively. The group of male students showed the least increase in average mean scores. However, this group still had an increase in average mean scores of 7.8.

TABLE II

DISTRIBUTION OF PRE TEST AND POST TEST MEAN SCORES AND MEAN SCORE DIFFERENCES FOR FOURTH GRADE STUDENTS IN JACKSON COUNTY BY PLACE OF RESIDENCE, RACE AND SEX

		Pre Test Mean Score	Post Test Mean Score	Difference in Mean Score
Place of Residence	Farm	50.5	61.9	+11.4
	Non-Farm	48.8	65.6	+16.8
Race	Caucasian	50.0	59.5	+ 9.5
	Negro	43.0	53.5	+10.5
Sex	Male	50.6	58.4	+ 7.8
	Female	48.6	61.2	+12.6

Many fourth grade teachers reported that students of this grade were very enthusiastic throughout the series of programs. They were also

pleased to have the opportunity to be a member of the 4-H TV Science Project and to become acquainted with the 4-H Club Program. As a result of this enthusiasm, these students completed one or more science projects that grew out of the information from the series of programs.

As a whole fourth grade students showed the greater overall improvement and interest than did students in any other grade included in the study.

Table III shows the results in grade five where there was an increase in average mean scores, but the increase is not as large as in grade four. However, there was an increase in average mean scores in every category of race, sex, and place of residence.

TABLE III

DISTRIBUTION OF PRE TEST AND POST TEST MEAN SCORES AND MEAN SCORE DIFFERENCES FOR FIFTH GRADE STUDENTS IN JACKSON COUNTY BY PLACE OF RESIDENCE, RACE AND SEX

		Pre Test Mean Score	Post Test Mean Score	Difference in Mean Score
Place of Residence	Farm	45.0	52.5	+7.5
	Non-Farm	42.9	48.8	+5.9
Race	Caucasian	43.7	50.1	+6.4
	Negro	38.2	39.5	+1.3
Sex	Male	44.1	49.7	+5.6
	Female	43.1	49.8	+6.7

Students who lived on farms showed the largest improvement with an average mean score difference of 7.5. Girls had a similar increase

with a difference between pre tests and post tests average mean scores of 6.7.

Caucasian students had an increase in average mean score of 6.4. Negro students in the fifth grade with a score increase of 1.3 showed the least improvement in this grade and for any group included in the study.

Table IV indicates that of the eighty students tested in grade six, those who lived on farms showed the largest improvement with a 13.0 increase in average mean scores.

TABLE IV

DISTRIBUTION OF PRE TEST AND POST TEST MEAN SCORES AND MEAN SCORE DIFFERENCE FOR SIXTH GRADE STUDENTS IN JACKSON COUNTY BY PLACE OF RESIDENCE, RACE AND SEX

		Pre Test Mean Score	Post Test Mean Score	Difference in Mean Score
Place of Residence	Farm	49.5	62.5	+13.0
	Non-Farm	45.6	51.6	+ 6.0
Race	Caucasian	48.6	57.5	+ 8.9
	Negro	36.1	40.0	+ 3.9
Sex	Male	48.9	54.4	+ 5.5
	Female	46.2	54.9	+ 8.7

As groups, caucasian and female students showed improvements that were almost identical with an 8.9 and 8.7 increases in average mean scores respectively. The Negro group showed the least improvement in this grade with a 3.9 increase in average mean scores.

As a whole, the sixth grade students did not do as well as the other three grades.

Table V shows the results of grade seven. Non-farm students with an increase in average mean scores of 18.1 showed the largest change in knowledge gained for this grade or for any other group that was tested. However, as a whole, the other groups in the grade did about as well as the average in the other grades. The female and farm students had the next greatest gain in knowledge with increased average mean scores of 5.9 and 5.8 respectively. Negro students showed the least improvement with an increase of 2.4.

TABLE V

DISTRIBUTION OF PRE TEST AND POST TEST MEAN SCORES AND MEAN SCORE DIFFERENCES FOR SEVENTH GRADE STUDENTS IN JACKSON COUNTY BY PLACE OF RESIDENCE, RACE AND SEX

		Pre Test Mean Score	Post Test Mean Score	Difference in Mean Score
Place of Residence	Farm	51.0	56.8	+ 5.8
	Non-Farm	47.8	65.9	+18.1
Race	Caucasian	48.5	54.7	+ 6.2
	Negro	41.1	43.5	+ 2.4
Sex	Male	48.4	51.8	+ 3.4
	Female	49.9	55.8	+ 5.9

Considering all the grades, students in the lower grades were much more enthusiastic and receptive to the 4-H TV Science Project.

Most teachers considered the project to be an excellent method of teaching students in grades, four, five, and six, but few thought the project was worth the effort for seventh graders.

The higher scores of many of the students seemed to be due to stronger motivation of the science teachers and parents, and popularity and effectiveness of the general 4-H Club Program in the particular community. Some 4-H'ers reported that they received some good information which was later used in project demonstrations or exhibits.

Testing the Hypothesis

In Table VI are shown the "t" and "z" values obtained for each group of students in grades four, five, six, and seven. At the 5 per cent level post test scores for twenty-three of the twenty-eight groups were significantly higher than the pre test scores. Therefore, for these twenty-three cases the null hypothesis that, "there is no significant difference in the mean of the pre test and post test scores" is rejected.

TABLE VI

DISTRIBUTION OF "t" AND "z" VALUES FOR AVERAGE MEAN SCORES OF RESPONDENTS BY RACE, SEX, PLACE OF RESIDENCE, AND GRADE IN SCHOOL AT THE FIVE PER CENT LEVEL

	Grade 4 t or z value	Grade 5 t or z value	Grade 6 t or z value	Grade 7 t or z value
Farm	t = 3.14	z = 3.42	*z = 2.42	z = 2.93
Non-Farm	z = 9.2	z = 3.52	z = 3.55	z = 3.45
Caucasian	z = 4.35	z = 4.56	z = 3.17	z = 4.38
Negro	t = 3.29	*t = .11	*t = 1.54	*t = .820
Male	z = 3.99	z = 3.63	*z = 2.05	z = 4.61
Female	z = 3.34	z = 3.14	z = 3.98	z = 4.65
All	z = 5.58	z = 4.73	z = 3.99	z = 4.73

*Denotes those cases in which the level of learning was not significant.

In the remaining five cases, Negro students from grades five, six, and seven, male students and sixth grade students who live on farms, there was no significant difference in the mean of pre and post test scores. Thus, confirming for these cases the null hypothesis.

According to the "t" and "z" tests in Table VI, non-farm children learned more in every grade than did farm youth. Likewise, caucasian youths learned more than did Negro students in grades four through seven.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

While no responses were recorded from the science teachers in the elementary schools of Jackson County, the author discussed with them the 4-H TV Science Project and the series of programs after the project was completed. Most of the teachers gave a very favorable response to the programs that were telecast.

Teachers who were able to incorporate the 4-H TV Science Project into the regular science class activities reported a more favorable response than those unable to do so. Many teachers commented that the series of films served as a supplement to the regular class by providing some excellent teaching resources. Class discussions, demonstrations, and exhibits were the most popular activities engaged in by the students.

All teachers thought the project would have been much more effective if the series of films had been scheduled during the school hours. The after-school scheduling resulted in conflicts for both students and teachers in viewing the programs. The teachers also thought that if the productions had been made in color, it would have helped to hold interest during the programs as well as throughout the series.

Response of Students

The 4-H TV Science Project was projected as an effective means of introducing young people to ten general areas of science and creating a greater understanding of 4-H among young people and their parents.

The results showed a generally favorable attitude toward 4-H and the 4-H TV Science Project among children who finished the series. Even so, as might be expected, some groups were less favorable than others.

Students in grades four and five were much more enthusiastic about the programs and participated in the suggested projects much more enthusiastically than those in grades six and seven. Some of the sixth and even more of the seventh grades considered the series of programs too elementary for them and did not carry out the suggested activities. The attitudes of the regular viewers were much more favorable than those who viewed only one or more programs.

The students who viewed the programs regularly engaged in more science activities as a result of viewing the programs than did those who viewed only one or two programs.

A number of students in grades five and six who had not been 4-H members prior to enrolling in the 4-H TV Science Project became regular members following the series.

According to comments of both students and teachers, a major weakness of the series of films was the scheduled viewing time. Most students indicated that the best time to view the programs was during

the school hours. Various conflicts with extra-curricular activities interfered somewhat with parents and other household members' programs. Other less common complaints were, conflicts with school bus schedule, TV out of repair, and the black and white programs.

The majority of students who completed the project stated that Saturday morning would have been the most suitable time to view the program outside of school hours. Most students said that if they missed the program on Monday afternoon at 4:30 on educational television, they hardly ever saw the program at the other viewing times which were Thursday morning at 6:30 and Sunday morning at 8:30.

Conclusions

Television occupies a place in practically every home today. Through this study it was determined that television can be used effectively in teaching science and helping students and parents to become more familiar with 4-H Club work. All respondents in grades four through seven had an increase in average mean test scores as a result of being exposed to the 4-H TV Science series. However, the extent of learning varied within and among grades.

Respondents in grade four exhibited the greatest advancement in knowledge as reflected in the mean test scores. Grades five and six experienced approximately the same degree of advancement. Respondents in grade seven had the least improvement as reflected by the average mean scores.

The test results indicate that the TV Science Project does

have an appeal to students in all grades, but students in lower grades were more favorable to the programs than those in the higher grades.

Follow-ups in the regular science class with discussions and project activities serve to keep the students interested and increases the effectiveness of the 4-H TV Science Project. In absence of the follow-up, interest and participation are likely to decline.

The time of telecast for the programs is one of the most important factors in planning a series of educational programs on television. Most students and science teachers preferred the telecasts during the school day or on Saturday morning.

Most teachers considered the programs to have a great potential for reaching a large audience with subject matter and teaching expertise that would not otherwise be available. Some teachers considered their class schedules too tight and were in doubt as to whether they could accept the responsibilities of undertaking the project.

A few students and parents rejected the idea of using commercial television as a teaching medium because they considered it to be a device for providing news, weather, sports and movies and not as a teaching media.

By way of review the 4-H TV Science Project as implemented in Jackson County, was used to teach students in grades four through seven about fire, animals, astronomy, plants, archeology, physics, behavior, microbiology, meteorology and chemistry. These boys and girls were able to conduct easy-to-do experiments designed to help

them understand some of the basic principles and concepts of science and 4-H Club work.

Considering the project as a whole, the author contends that the medium of television can be used effectively as a device for teaching science and familiarizing youth and parents with 4-H Club work carried out under the leadership of the Cooperative Extension Service.

Recommendations

1. Every effort should be made by parents, teachers, county Extension agents and local 4-H leaders to emphasize the importance of the 4-H TV Science Series and other related subject-matter areas on educational television.
2. County Extension workers should inform school officials so that they will have a clear understanding of how the TV Science project is to be carried out and what is expected of each individual.
3. The Extension Service should further study the existing programs and keep abreast of new ideas and information concerning educational television programs, as well as 4-H program ideas that will be suitable for today's youth.
4. Effective follow-up should be a necessity in educational television. This is essential if the program is to achieve the desired goals.
5. Further study should be done in the area of educational television. Special emphasis needs to be placed on

developing the type of program that is interesting and educational to the age group which views the programs.

6. Programs should be in color in order to have more eye appeal to the audience.
7. Further study is needed to determine a more appropriate time of telecast for educational television programs.
8. More efforts are needed by Extension personnel in emphasizing the importance of placing 4-H TV Science in the school curriculum in the elementary grades in order to obtain maximum benefits.

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APPENDIX

APPENDIX A

THE QUESTIONNAIRE USED BY EACH OF THE
GRADES OF FOUR THROUGH SEVEN

NAME_____ SCHOOL_____ COUNTY_____

ADDRESS_____ PARENT'S NAME_____ SEX____ AGE_____

RACE_____ GRADE_____ PHONE NUMBER_____

Previous 4-H member? YES_____ NO_____

Check one of the following: ___Live on farm ____Do not live on a farm

List the number of science courses taken_____ a. List your favorite

subject_____ b. List the one you dislike most_____

GRADE FOUR

CIRCLE THE LETTER WHICH BEST FITS QUESTIONS BELOW

1. Extinguishers are designed to: a. start a fire; b. put out a fire; c. aid a fire to burn; d. act as a catalyst.

2. The three requirements for fire are: a. fuel, oxygen, and heat; b. fuel, carbon dioxide, and heat; c. fuel, carbon dioxide, and nitrogen; d. fuel, heat, carbon monoxide.

3. Bones may change in size to allow for: a. food digestion; b. growth; c. blood cells to develop; d. blood circulation.

4. Zoology is the science of: a. plants; b. animals, c. astronomy; d. machinery.

5. A telescope is used mostly by a: a. chemist; b. astronomer; c. physicist; d. geologist.

6. Polaris is a star directly above: a. the South Pole; b. the North Pole; c. the moon; d. the Big Dipper.

7. Botany is: a. a type of animal; b. the science of plants; c. a type of bottle; d. the study of microbes.

8. When plants grow, sunlight: a. is not necessary for photosynthesis to take place; b. is necessary for photogynthesis to take place; c. actually is harmful to most plants; d. cannot be substituted by artificial light.

9. Fossils may be: a. footprints or tracks; b. grinding stones, carvings, and paintings; c. scientific measuring instruments; d. cloud formations.

10. Artifacts are usually: a. strong and durable; b. brittle and easily damaged; c. usually in powder form; d. sold in grocery stores.

11. Air pressure is measured with: a. a barometer; b. a tensiometer; c. an altimeter; d. a thermometer.

12. A vacuum is a: a. space containing air and moisture; b. space containing nothing; c. space containing various gases; d. a space containing only moisture.

13. Psychology is the: a. Science of plants; b. Science of weather; c. Science of behavior; d. Science of the planets.

14. Most animals: a. cannot learn; b. cannot remember events; c. can learn; d. always refuse to learn.

15. Measles, mumps, rabies, and yellow fever are caused by: a. a type of virus; b. an infection; c. a bacteria; d. the wind.

16. Precipitation gauges are used: a. to measure air pressure; b. to measure rain and snow; c. to measure wind speed; d. to measure traffic flow.

17. Warm air: a. weighs less per volume than cool air; b. has less capacity for water vapor; c. stays near the floor in a room; d. carries less germs generally.

18. Liquids: a. cannot be changed to a solid; b. can be changed to a solid; c. will not boil as fast when table salt is added; d. all freeze at 32 degrees Fahrenheit.

19. The cedar tree is a member of the: a. cone bearing plants; b. flowering plants; c. decidious tree group; d. hardwoods.

20. Microbes grow best in: a. a cool place; b. a cold damp place; c. a warm place; d. in a cool dry place.

GRADE FIVE

CIRCLE THE LETTER WHICH BEST FITS QUESTIONS BELOW

1. Baking soda can be used to: a. start a fire; b. extinguish a fire; c. act as catalyst; d. speed the burning of a fire.

2. The three requirements for fire are: a. fuel, oxygen, heat; b. fuel, carbon dioxide, heat; c. fuel, carbon dioxide, nitrogen; d. fuel, carbon monoxide, hydrogen.

3. Bones grow by adding cells: a. to the end of bones; b. along lines of stress in any direction; c. for blood vessels to develop; d. to aid in blood circulation.

4. A purpose of the skelton is: a. to provide a supporting framework for the soft parts; b. of no real importance to most animals; c. supply blood vessels; d. not for protection.

5. Polaris is a star which: a. can be used as a reference point; b. is located in a different position in the different seasons of the year; c. is located above the South Pole; d. Moves at different seasons of the year.

6. A sundial: a. shows the position of the stars; b. tells hours and months in relation to their shadows; c. measures the intensity of the sun; d. measures the speed of light.

7. The cedar tree is a member of the: a. cone bearing plants; b. flowering plants; c. decidious tree group; d. hardwoods.

8. Botany is: a. a type of animal; b. the science of plants; c. of more importance to the astronomer than a farmer; d. studying the earth's planets.

9. Artifacts are usually collections of: a. leaves; b. arrowheads and beads; c. books; d. facts and figures.

10. Artifacts are usually: a. strong and durable; b. collections of facts and figures; c. brittle and easily damaged; d. very dangerous to handle.

11. Gases can be compressed by: a. increasing the pressure; b. decreasing the pressure; c. heating the container; d. cooling the container.

12. A vacuum is: a. a space containing air and moisture; b. a space containing nothing; c. a space containing various gases; d. a space containing only oxygen.

13. Phobia is: a. the fear of certain anxiety-producing conditions; b. the happiness received from certain acts; c. a type of disease which is difficult to control; d. a virus.

14. Pathogenic microorganisms: a. are harmless and useful; b. cause disease; c. are a type of gene which make up the human body; d. are not useful.

15. Microbes grow best in: a. a cool place; b. a cool, damp place; c. a warm place; d. in a cool, dry place.

16. Meteorology is the study of: a. the atmosphere and its changes; b. the metals used for buildings; c. meters used by gas and electric companies; d. the metallic elements.

17. Water: a. heats and cools more slowly than land; b. heats and cools quicker than land; c. boils at 210 degrees F.; d. freezes at 30 degrees Fahrenheit.

18. For any particular substance the: a. solid state exists at lower temperatures than the liquid; b. solid cannot be changed to a liquid; c. freezing temperature is 32 degrees Fahrenheit; d. boiling temperature is 212 degrees Fahrenheit.

19. The embryo is a part of the: a. stem; b. seed; c. leaf; d. root.

20. Altimeters are used to: a. measure air pressure; b. measure altitude; c. measure speed of sound; d. determine water hardness.

GRADE SIX

CIRCLE THE LETTER WHICH BEST FITS QUESTIONS BELOW

1. Baking soda can be used: a. to start a fire; b. as medication on a burn; c. to extinguish a fire; d. act as a catalyst.

2. Carbon dioxide (CO_2): a. does not burn; b. is visible; c. burns quickly; d. makes fire burn faster.

3. Bones grow by adding cells: a. to one end; b. along lines of stress in any direction; c. at both ends; d. to speed up blood circulation.

4. An insect is an animal in the family of: a. vertebrates; b. invertebrates; c. endoskeletons; d. animals with no skeleton.

5. The day may be measured by: a. the rotation of the earth; b. the number of stars visible on a clear night; c. the position of the moon; d. the relationships between sun and moon.

6. Polaris is a star directly above: a. the North Pole; b. the South Pole; c. the Big Dipper; d. the star Jupiter.

7. Botany is: a. a type of animal; b. the science of plants; c. of little importance to a farmer; d. a planet in the universe.

8. The embryo is a part of the: a. stem; b. seed; c. leaf; d. root.

9. An Artifact collection would include: a. arrowheads, beads, paintings; b. varieties of leaf collections; c. facts and figures of the population; d. farm census data.

10. When an Artifact is found one should: a. never move it until it is tagged and recorded; b. label at the most convenient time; c. take precautions because they are very dangerous to handle; d. always seek additional help.

11. The depth of water in a pool: a. does not have any effect on pressure; b. does have an effect of pressure; c. has no effect on human ears; d. is influenced by the position of the earth.

12. Altimeters are used to: a. measure air pressure; b. measure altitude; c. measure speed; d. measure speed of sound.

13. When we speak of an "educated guess" we usually talk about: a. an observation; b. a hypothesis; c. a conclusion; d. results.

14. When we talk of the conclusion from an experiment, we are talking about: a. what we expect to find out in a test; b. the statement of results; c. the statement of the predictions of results; d. the beginning of an experiment.

15. Microbiology is the study of living things: a. that are large enough to be seen with the naked eye; b. that are not to be seen without the aid of magnification; c. that are of interest to only the animal scientist; d. that live only in the desert.

16. Microbes grow best in: a. a cool place; b. a warm place; c. cool-dry place; d. a cool-damp place.

17. Water: a. heats and cools more slowly than land; b. heats and cools quicker than land; c. boils at 210 degrees Fahrenheit; d. Freezes at 30 degrees Fahrenheit.

18. Soap: a. reduces the surface tension of water; b. actually has no effect on water; c. makes water boil much faster; d. makes water freeze quicker.

19. When plants grow they: a. grow toward light; b. grow away from light; c. are not affected by light; d. can live without light.

20. Archaeology is the study of: a. insects; b. the moon and its planets; c. life and culture of ancient peoples; d. life of people today.

GRADE SEVEN

CIRCLE THE LETTER WHICH BEST FITS QUESTIONS BELOW

1. The kindling temperature depends on the: a. chemical nature of the substance; b. carbon dioxide present; c. amount of chlorine present; d. amount of hydrogen present.

2. Carbon dioxide (CO_2): a. does not burn; b. is visible to the eye; c. burns fast; d. is given off by trees.

3. An insect is an animal without a backbone and is in the family of: a. vertebrates; b. invertebrates; c. endoskeleton; d. animals with no skeleton.

4. Birds are able to fly because: a. they have light-air filled bones; b. have feathers instead of hair on their bodies; c. they only have two legs; d. they live in trees.

5. The year is based on two types of observations: a. the tropical year and sub-tropical year; b. the tropical year and sideral year; c. the sideral and sub-tropical year; d. the subsideral year.

6. Polaris is a star directly above: a. the South Pole; b. the North Pole; c. the Big Dipper; d. Jupiter.

7. The embryo is a part of the: a. stem; b. seed; c. leaf; d. root.

8. Germination is the process of: a. being infected with germs and causing a disease; b. the start of growth or sprouting; c. being infected with a virus; d. being infected by a virus.

9. When plants grow they: a. grow toward light; b. are not affected by light; c. grow away from light; d. can live without light.

10. Archaeology is the study of: a. insects; b. the moon and its planets; c. life and culture of ancient peoples; d. life and culture of the people of today.

11. Artifacts are usually: a. strong and durable; b. brittle and easily damaged; c. strong and brittle; d. facts on ancient peoples.

12. The depth of water in a lake: a. does not have any effect on pressure; b. effects the fish population; c. does have effect on pressure; d. never effects swimmers.

13. When we speak of an "educated guess" we are talking about: a. an observation; b. a hypothesis; c. a conclusion; d. results.

14. Phobia is: a. the fear of certain anxiety-producing conditions; b. the happiness received from certain acts; c. the act of accomplishing certain acts; d. a disease.

15. Microorganisms: a. are all harmful and should be destroyed; b. may be harmful or useful; c. can be seen with the naked eye; d. can be seen without a microscope.

16. A radar instrument may be used: a. to measure air pressure; b. to locate cloud formations; c. to locate planets; d. study plants.

17. What effect does soap have on water? a. reduces the surface tension; b. makes it boil faster; c. actually has no real effect; d. makes it freeze faster.

18. Every substance: a. boils and melts at the same temperature; b. has a particular boiling and melting point; c. boils at 212 degrees Fahrenheit; d. freezes at 32 degrees.

19. Baking soda can be used: a. to start a fire; b. as medication for a burn; c. to extinguish a fire; d. act as a catalyst.

20. Microbes grow best in: a. a cool place; b. a warm place; c. cool-dry place; d. a cool-damp place.

APPENDIX B

INDIVIDUAL PROGRAM DATA

4-H TV SCIENCE CLUB

Number of Programs: 10 Type of Recording: VTR/Film Length: Half-Hour

General Description of Series

This series of 4-H SCIENCE CLUB programs took place in Advisor Jim Culver's basement recreation room which had been converted into a 4-H Clubroom. Here the five club members met each week to learn something about the many areas of Science from Archeology and Physics to Microbiology and the Science of Behavior. They began each meeting by seeing something of interest that the guest for the day had brought to show them. Then Jim Culver joined the members in the science demonstration area to explain some of the principles of that day's subject. Then they moved to the milk bar where they held their club meeting under the direction of President Rex Gates and Secretary Karn Weirman. After the business of the meeting had been handled, the members showed the project that each had been assigned at the last meeting. After Jim had discussed their projects with them, they moved to the guest-time area to meet the guest for the day. Here the club members listened to an authority on some phase of the subject for the day and the club members asked questions. After guest time, they moved back to the science corner to work on their own projects for the day.

4-H TV SCIENCE CLUB was produced by WMSB, Michigan State University Television. Producer: Jim Culver. Director: Kay Ingram. Science Advisor: Gerald Ritchey.

Featured Personality

Jim Culver who serves as Club Advisor on this series, is a producer on the WMSB Staff. Each program has a guest and a program consultant that are listed with the information on that particular program.

Program Number 1: THE SCIENCE OF FIRE

Jim and the club members discussed the science of fire and the value that fire has for us as well as how destructive it can be if not used carefully. They then examined different kinds of fire such as electrical or chemical which are used for cooking. They learned that the "triangle of fire" includes HEAT, AIR, AND FUEL and that fire is impossible when you remove any of these three elements. A match demonstrated this principle. After the demonstration they moved over to the meeting area to discuss what 4-H is and met the new 4-H members, David Gillespie and Graham Gal. They also discussed what they would like to see and do during the club-series. In an informal election Rex Gates was chosen President and Karn Weirman, Secretary. Then they met Inspector Alber who showed them how to extinguish fire with an invisible gas. He also showed them the many types of fire extinguishers, and then the club members demonstrated what they know about putting out a fire when someone's clothing catches fire. The members then began working on their projects to get them ready to show at the next meeting.

GUEST: Inspector Phillip Alber of the Lansing Fire Department.

Program Number 2: THE SCIENCE OF ANIMAL SKELETONS

Jim and the club members examined the skeletons of such animals as the alligator, frog, bird, turtle, fly, shell, and earthworm. In the meeting, Maureen demonstrated a carbon dioxide fire extinguisher she had made for that week's project, and Graham explained one he had made with soda and vinegar. The guest for this meeting was Dr. Rexford Carrow who showed the members how to have fun trying to unbutton their shirts and how to write without using their thumbs. Then he showed them a human skeleton and the club members learned some interesting facts about the 200 bones of the body. At the project table they learned how to preserve animals with alcohol.

GUEST: Dr. Rexford Carrow, Department of Anatomy, Michigan State University.

PROGRAM CONSULTANT: Dr. Art Reed, Department of Natural Science, Michigan State University.

Program Number 3: THE SCIENCE OF ASTRONOMY

Jim showed the members some ancient ways of telling time, the shadow stick, sun dial, Chinese Water Clock, the hour glass, and

a candle. Also Jim demonstrated how to make an alarm clock with a candle, a piece of string, and a weight. During the meeting, David showed his collection of snails, Graham showed his collection of shells, and Karn had started an insect collection. The club members then met Mrs. Joyce Ushman who told them how to tell time with the stars and showed them an astrolabe similar to the one used by Christopher Columbus, a sextent, and a star clock. At the project table they learned how to make a sun dial and an astrolabe.

GUEST: Mrs. Joyce Ushman, Michigan State University Planetarium.

Program Number 4: THE SCIENCE OF PLANTS

Jim showed the club members some unusual plants, such as the Mimosa that wilts when you touch it, and the pitcher plant that captures its own insects. In the meeting area Rex showed the members how he made an astrolabe, and Maureen showed them her Chinese Water Clock. Then Jim and the club members met Mr. James Dawson, a time-lapse photographer, who showed them some of his films. The members saw a tulip grow, a rose bloom, and a special sequence of "Bashful Joe", a shy blooming flower. Dr. Dawson then showed the club members how he took the film with his time-lapse equipment. The club members returned to the science area and tried some experiments with iodine to test various plants for starches.

GUEST: Mr. James Dawson, Noted Time-Lapse Photographer and Botanist.

Program Number 5: THE SCIENCE OF ARCHEOLOGY

Jim showed the club members a mummy of a little girl from Bolivia. They tried to discover facts about her by examining the belongings of the little girl that were buried with her, such as her sandal, her purse, a medicine bag, and a hairpin made from a thorn. Then they looked at some Indian artifacts, an Atlatl (spear thrower) and several arrowheads. In their meeting, David showed the members how to set up an experiment to see whether plants need their roots to get the water they need to grow, and Graham showed them how to set up an experiment to see how oxygen is given off by plants. At guest time they met Mr. Dirk Gringhuis who used a scale model of land to show how archeologists search for artifacts. Then Jim showed the club members how to make their own artifacts: plaster of paris necklaces or copies of masks from old tribes.

GUEST: Mr. Dirk Gringhuis, Artist and Writer.

Program Number 6: THE SCIENCE OF PHYSICS

Jim showed the club members that air exerts pressure by putting a ping-pong ball and a balloon over a stream of air and also by using suction cups. Karn and Graham had a tug of war, and Jim showed the members how to tip a glass of water upside down and not spill any. In the meeting Karn showed a necklace that she had made out of plaster of paris, and Rex showed a grid map he had drawn of his backyard. In guest time David Gillespie showed the members some of the guns he used in his 4-H Gun Safety Club as a demonstration of another use of air pressure. At the science area Jim showed the club members some film from General Motors of an air car and then they made a model air car.

GUEST: David Gillespie, 4-H TV SCIENCE CLUB MEMBER.

Program Number 7: THE SCIENCE OF BEHAVIOR

Jim and a special guest, Mr. Jim Reyniers, showed the club members how psychologists trained animals such as rats to respond to various things in order to get food or water. They saw a rat respond to a light and press a bar to make a dipper of water appear so that he can get a drink. They also watched a quail respond to a light to get food. In the meeting Maureen showed the group her water thermometer, and Graham explained his pop gun. At guest time the members met Dr. Gladys Anderson and her little friend Sigrud and they observed his behavior and interpreted what they saw as psychologists do. Then Dr. Anderson told them a story and asked them to finish it to show how different people respond to the same situation as a result of previous experience and training.

GUESTS: Mr. Jim Reyniers, Michigan State University; Dr. Gladys Anderson, Department of Psychology, Michigan State University.

Program Number 8: THE SCIENCE OF MICROBIOLOGY

Jim showed the club members some molds that have grown on beans, cheese, and bread. They discussed some of the conditions needed to allow molds to grow, and Jim showed them how important soap is in cutting through dirt to clean things. In the meeting David showed the members how he improved on one of the optical illusions they worked with last time, and Graham had fun fooling them with a "which is bigger" optical illusion test. At guest time they met Mrs. Maryln Lawrence, Microbiologist, who showed the members what magnifying glasses do and

then how a microscope worked. The club members then were given a chance to look at a drop of water through a microscope and at other slides that Mrs. Lawrence had prepared. Jim then showed them how to grow their own molds as projects for the next meeting.

GUEST: Mrs. Maryln Lawrence, Microbiologist.

Program Number 9: THE SCIENCE OF METEOROLOGY

Jim showed the club members some films of very severe weather and then demonstrated how to make a cloud and what elements go together to make up a storm, clouds, lightning, thunder, and wind. They saw how an anamometer placed on top of your head will have enough wind current to move caused by the heat of your body. In the meeting, Jim showed them the Venus Fly Trap he had grown and how it catches insects. At guest time they met Mr. Gale Biggs of the University of Michigan, and he showed them how to measure wind in the atmosphere and on the surface. Dave and Graham had a contest to see who had the most wind. Then Mr. Biggs showed them how to measure sunshine and at the project table Jim showed how to make a hygrometer and a barometer.

GUEST: Mr. Gale Biggs, University of Michigan.

Program Number 10: THE SCIENCE OF CHEMISTRY

Jim showed the club members some dry ice and demonstrated how to make a chemical garden. In the meeting Maureen showed the wind vane she had built, Graham showed the rain gauge he had made, and David his anamometer. In the guest time area they met Dr. Kenneth Burgess from the Dow Chemical Company who showed them some of the things industry is doing with chemistry today. They watched him make a fire extinguisher, some nylon, latex paint, and foam that was used for cushions and mattresses. In the project area Jim showed the club members how to preserve insects, coins, and other things in plastic.

GUEST: Dr. Kenneth Burgess, Dow Chemical Company.

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